

# AMSR-E sea ice products: Updates and validation

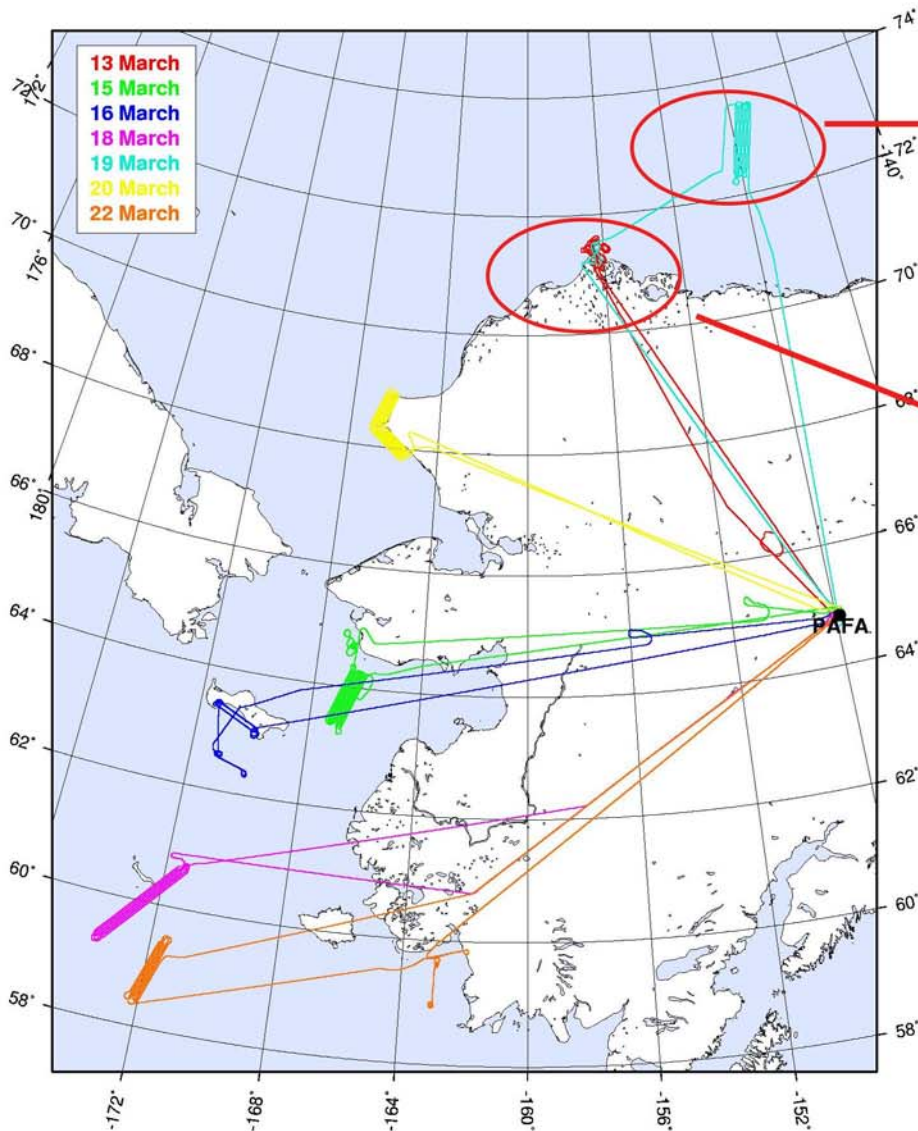
Thorsten Markus, NASA/GSFC

## Updates:

- The NT2 algorithm is now used to provide the standard ice concentration product for both hemispheres
- Differences between the NT2 and Bootstrap ice concentrations are still distributed
- The ice temperature is now derived using the 6 GHz TBs and the NT2 ice concentration



## 2003 Alaska Sea Ice Validation Missions



**March 19, 2003:**

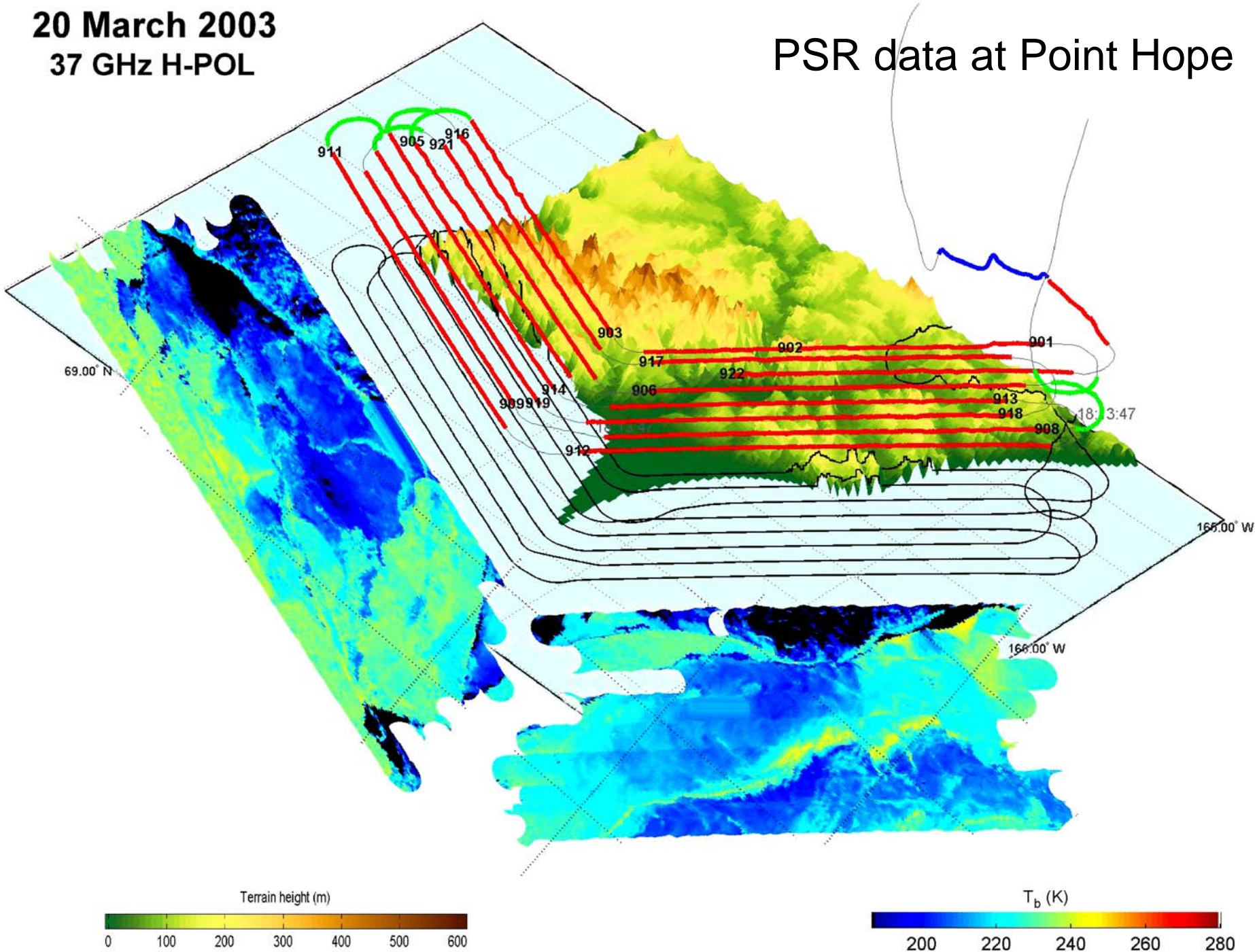
- Flights over NAVY Ice Camp at 4500 ft
- Firstyear and multi-year ice

**March 13, 2003:**

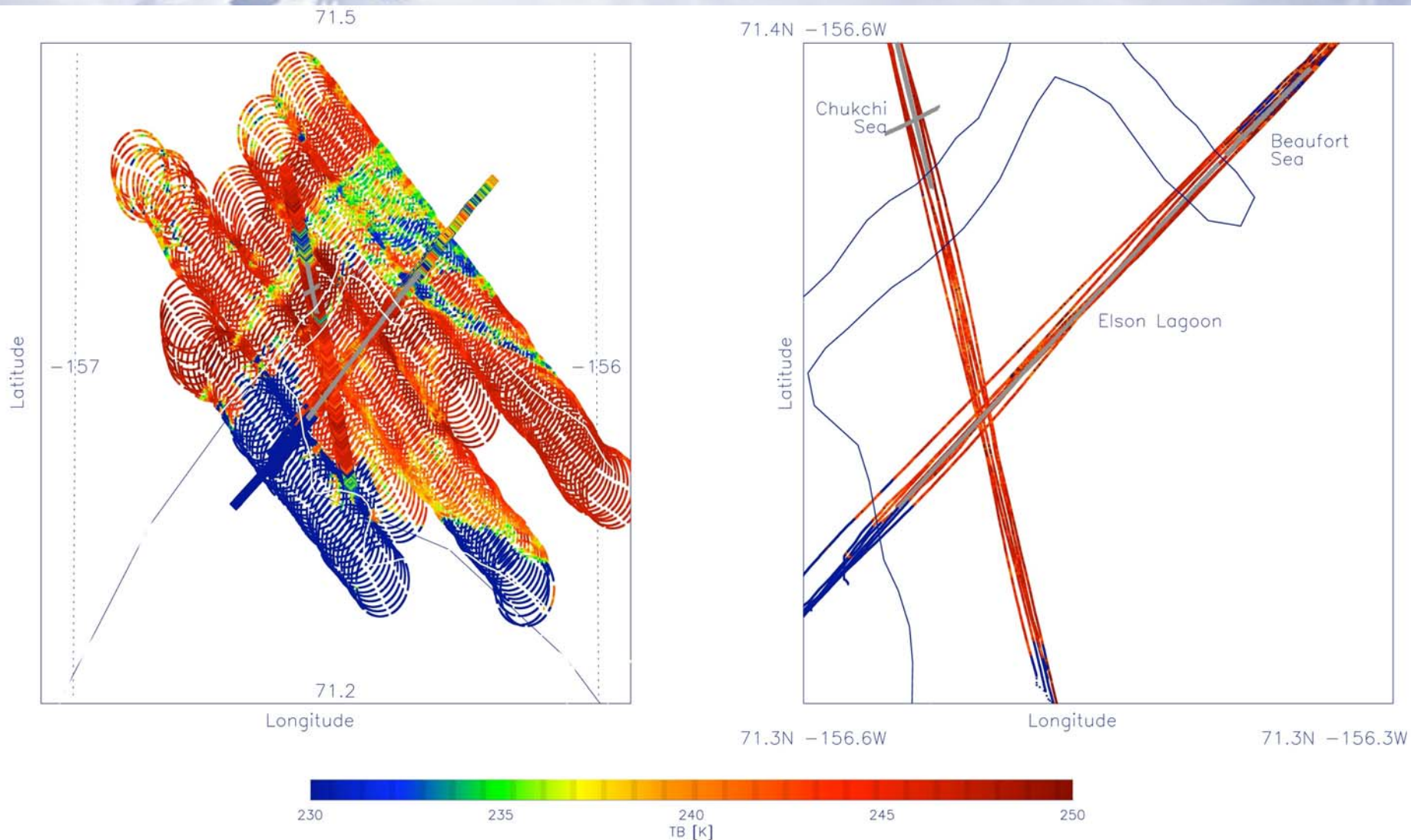
- Elson Lagoon (near Barrow) and adjacent oceans
- P-3 flights at
  - altitude of 500ft along transects (coordination with surface measurements)
  - altitude of 4500 ft to map the area

20 March 2003  
37 GHz H-POL

PSR data at Point Hope

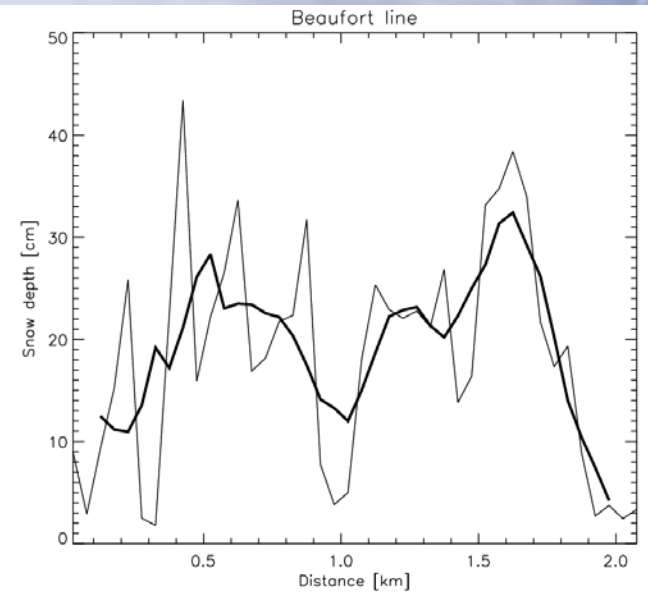
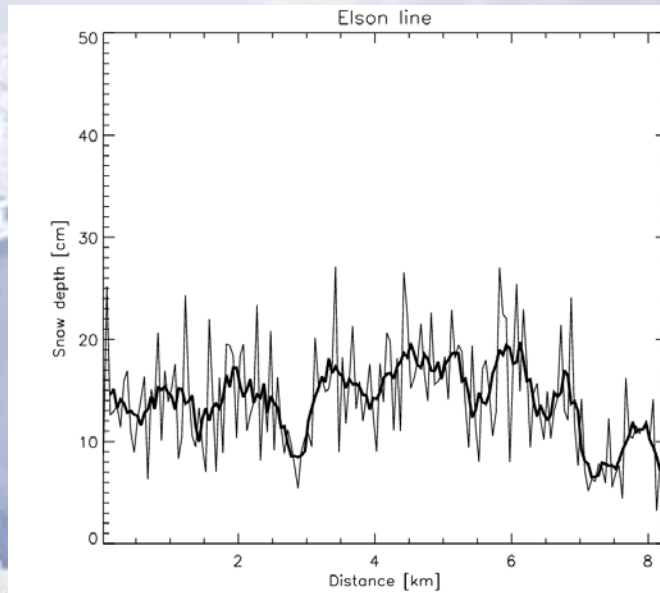


# AMSRice03 snow and temperature validation: Comparison of PSR data w/ in-situ measurements near Barrow

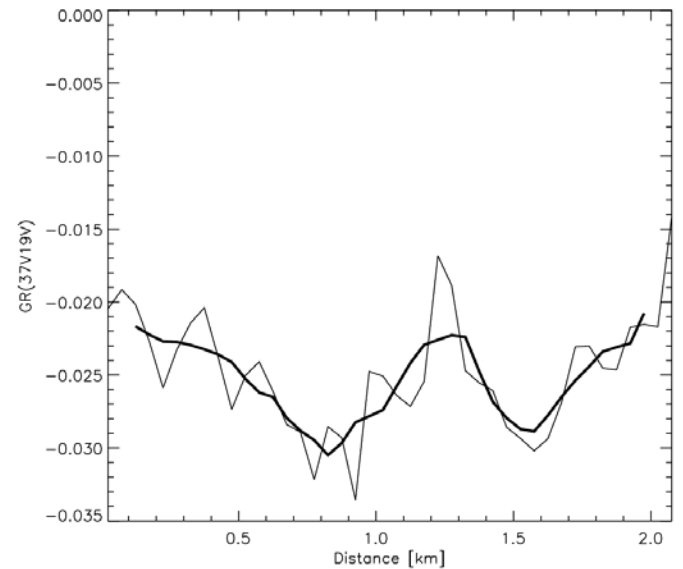
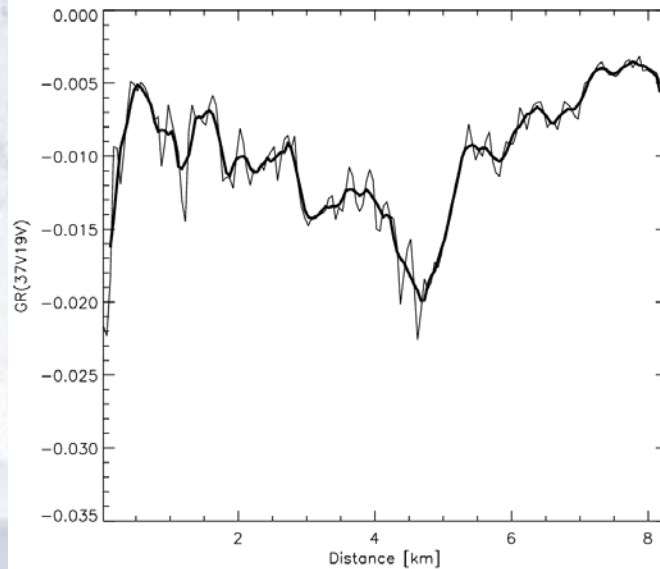


# AMSRIce03 snow validation:

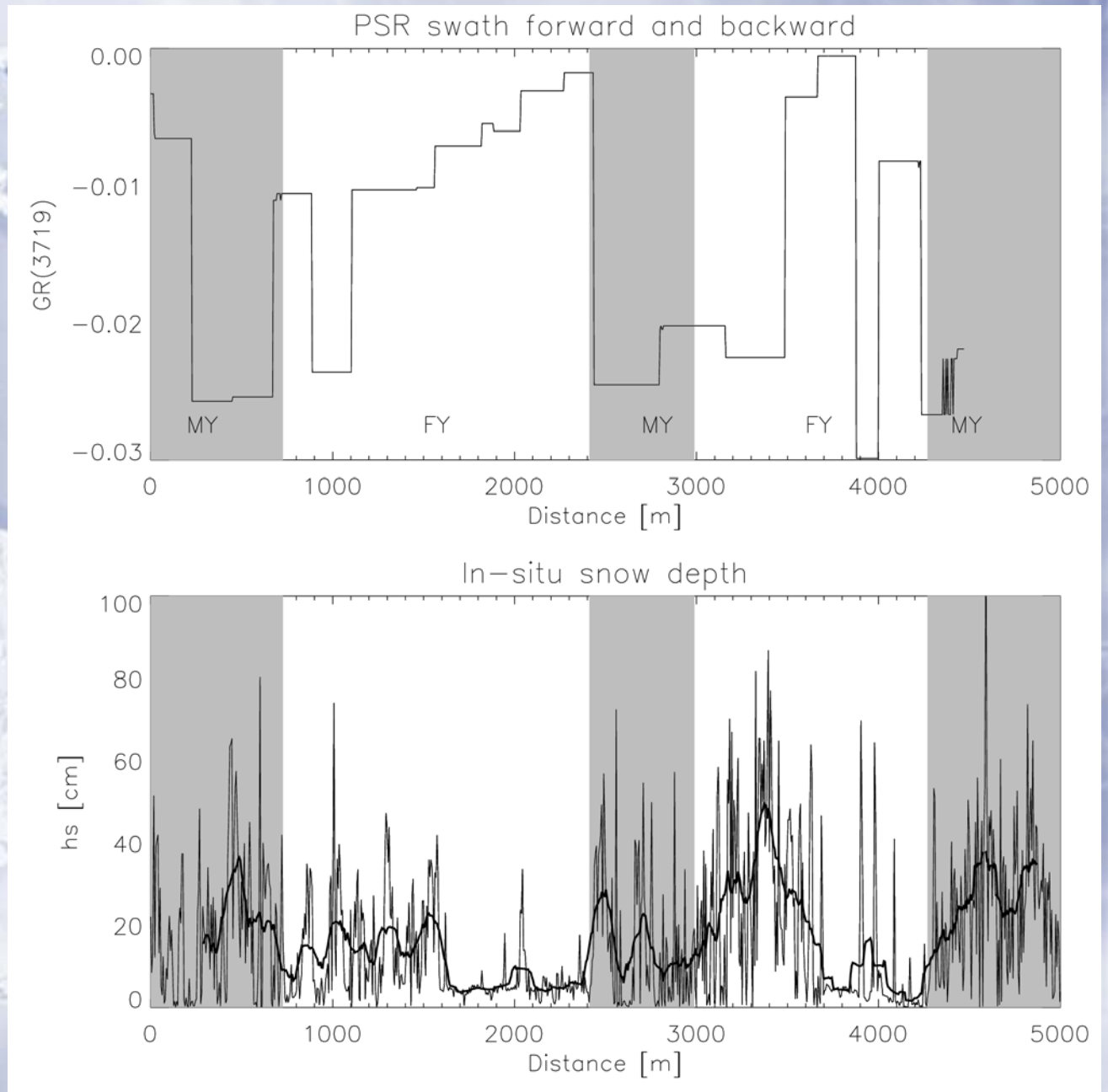
Snow depth:



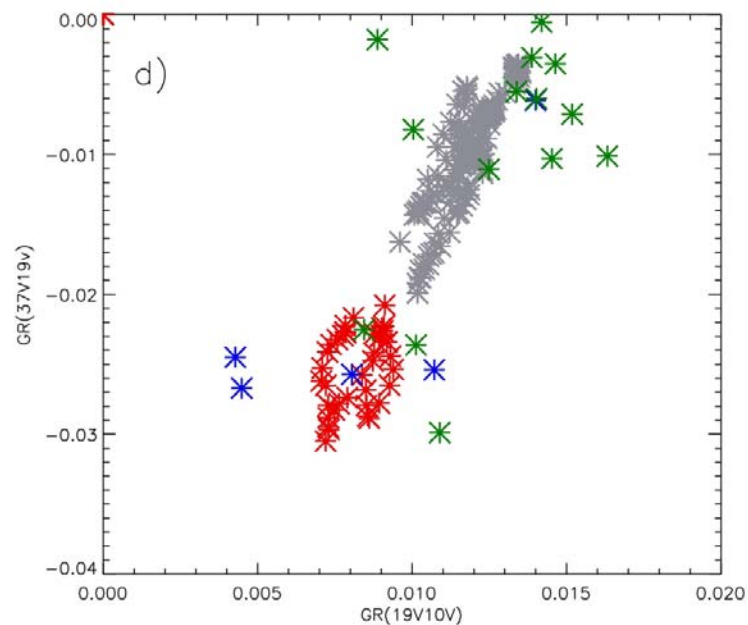
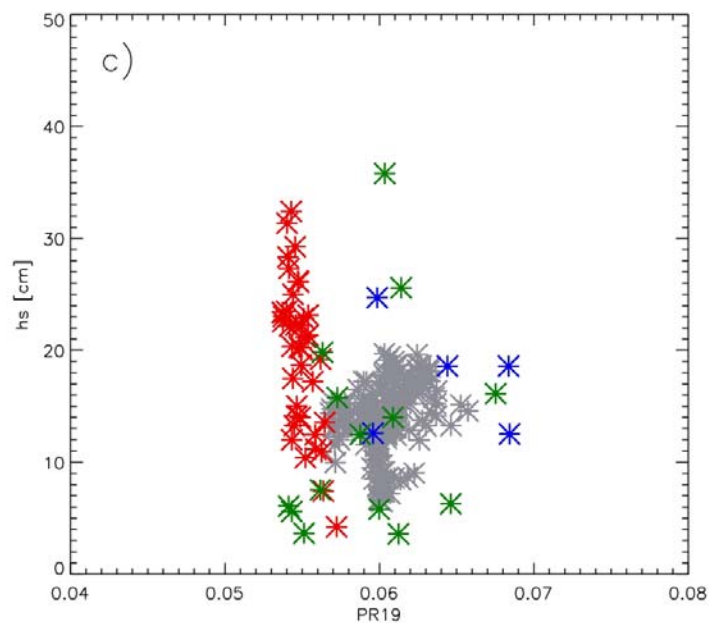
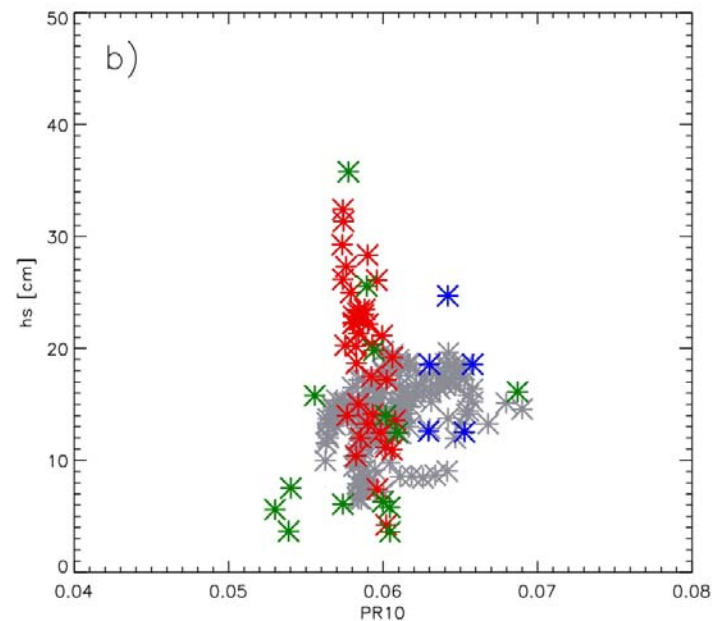
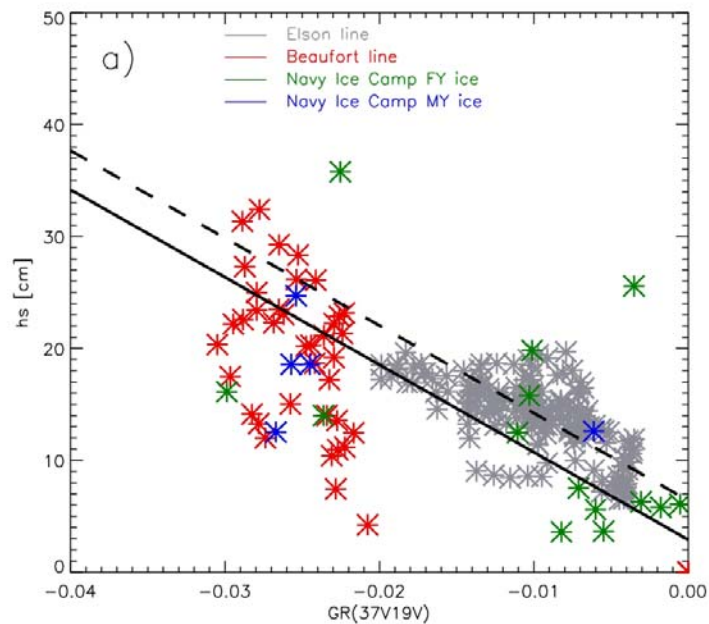
GR(37V19V):



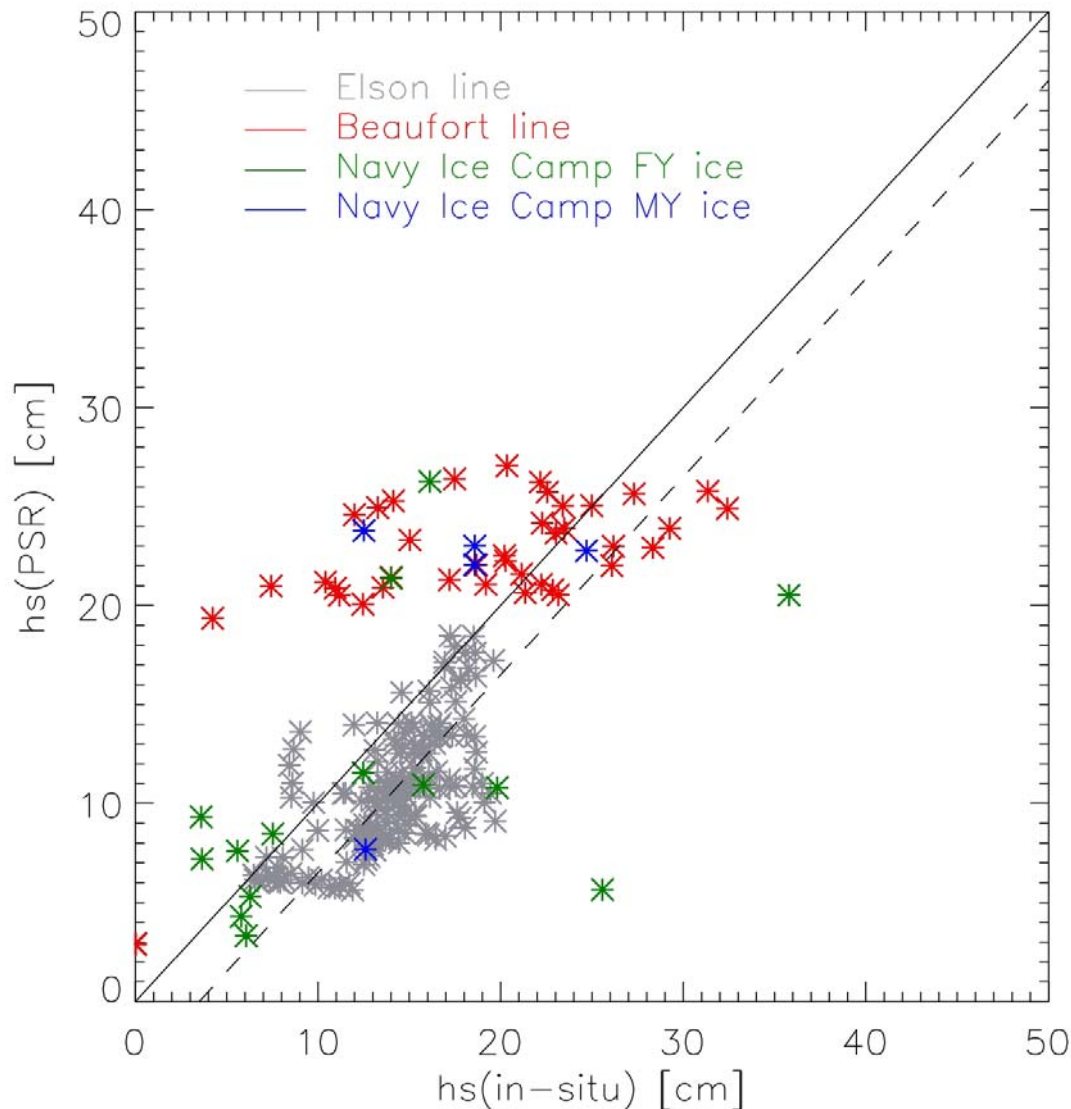
# AMSRice03 snow validation: Navy Ice Camp



# AMSRice03 snow validation:



# AMSRice03 Snow depth validation:

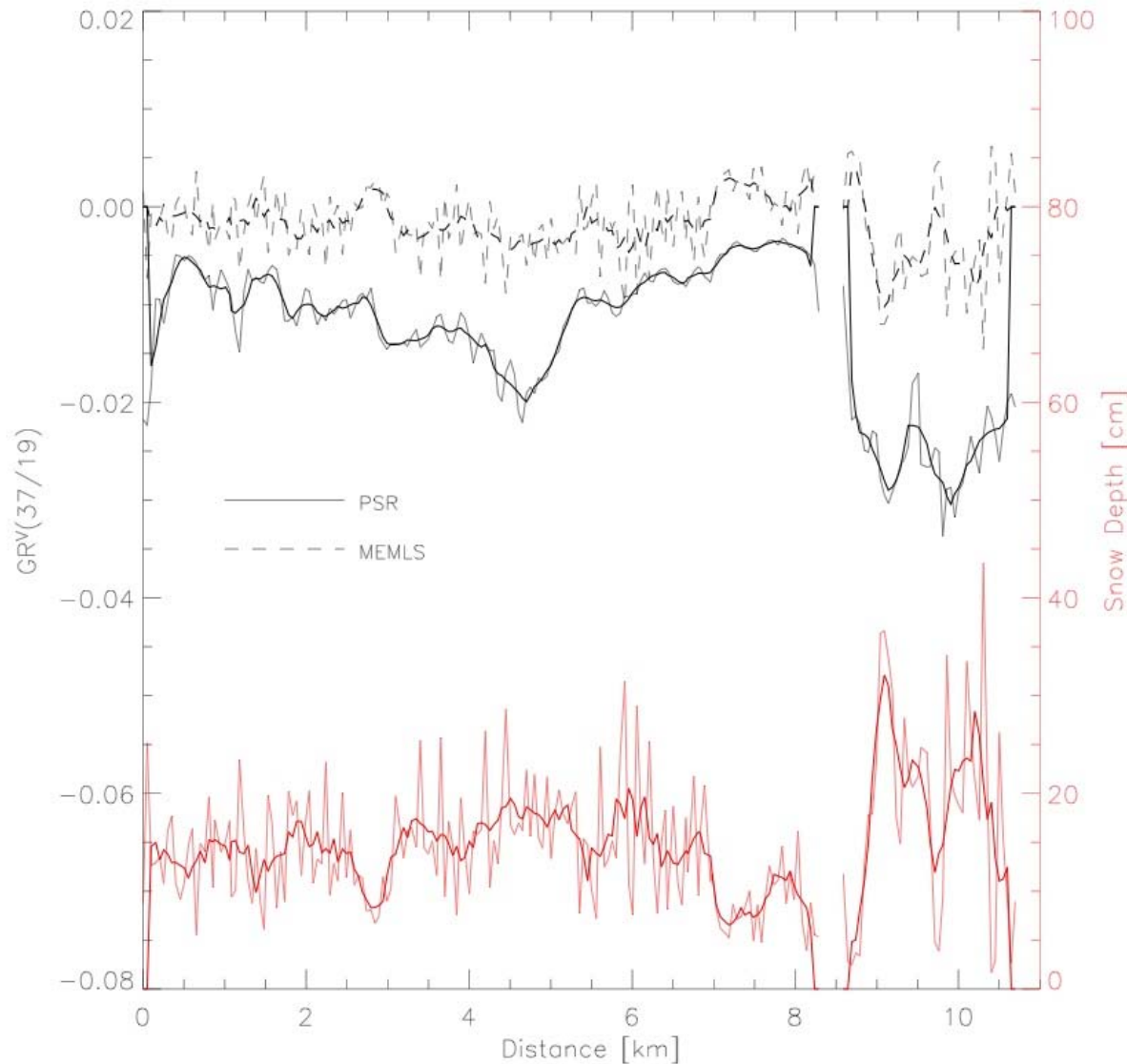


- Comparison of PSR data with in-situ snow depth near Barrow and near the Navy Ice Camp gives consistent results

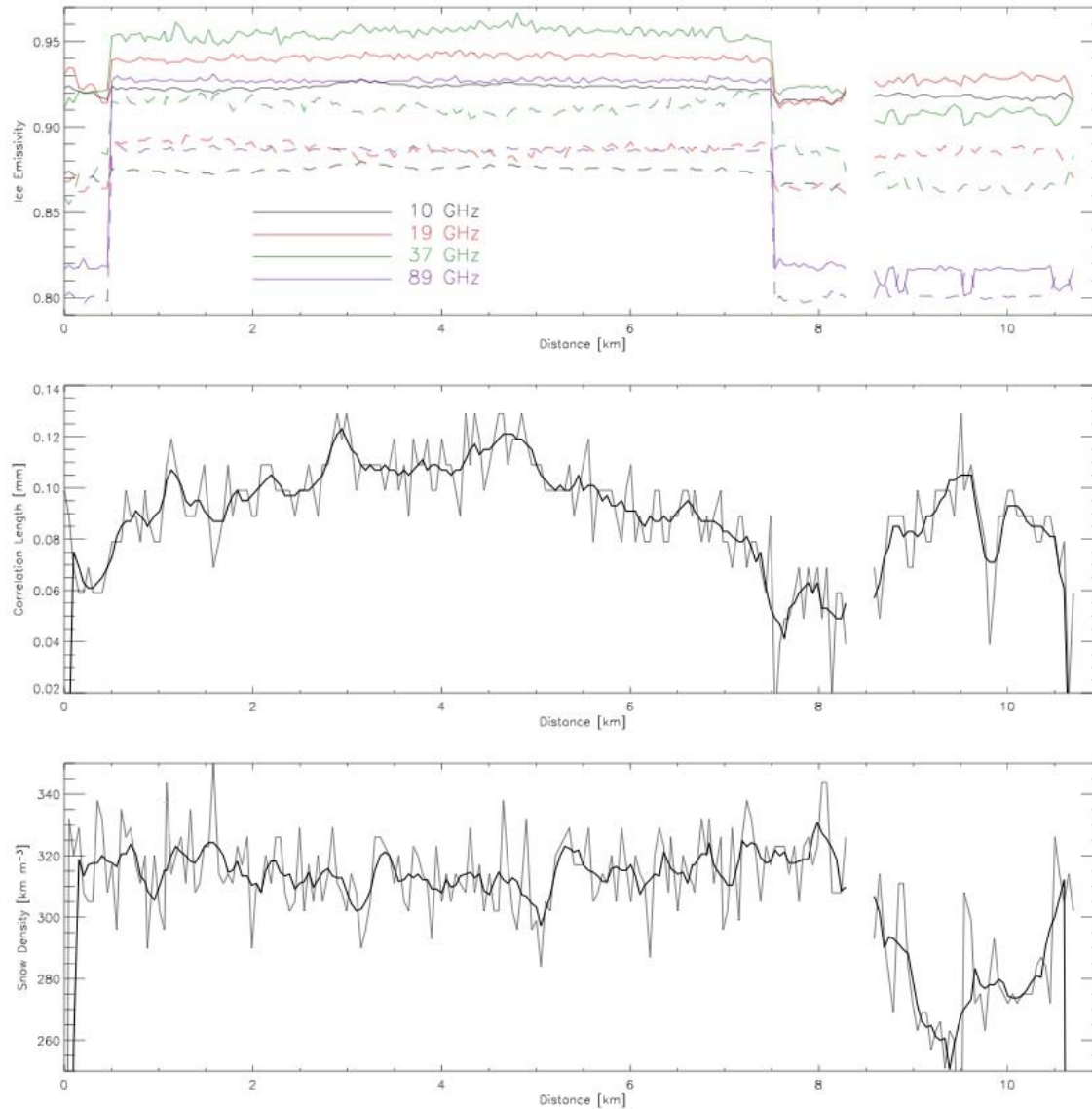
- For smooth FY ice good agreement between PSR and in-situ snow depth with existing AMSR-E algorithm coefficients

- For rough FY ice and MY ice it seems we need different algorithm coefficients; investigations are underway but clarification and possible solution must probably await 2006 campaign.

# AMSRice03 Snow depth validation: Use of modeling to reproduce PSR signatures



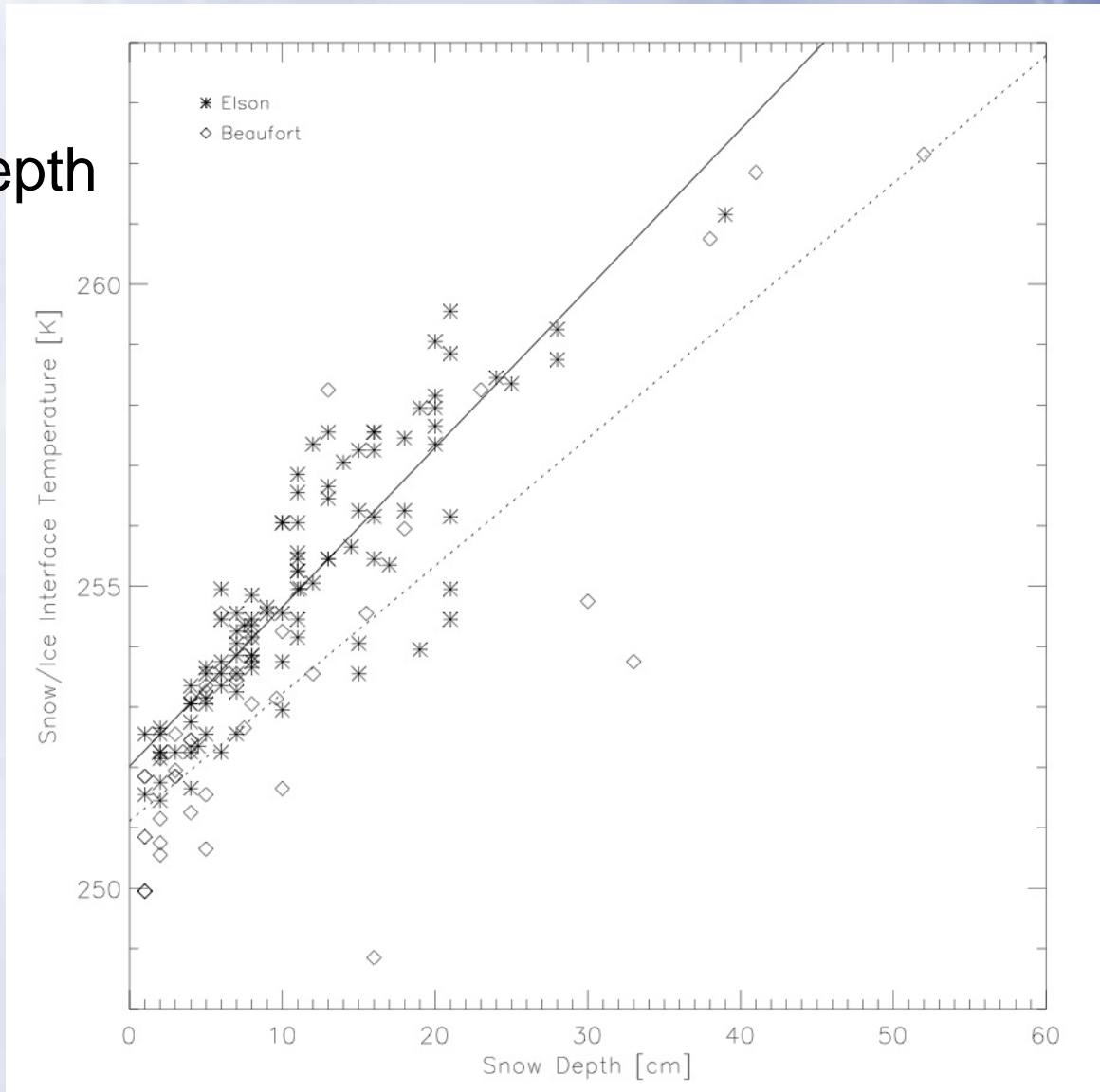
# AMSRice03 Snow depth validation (modeling):



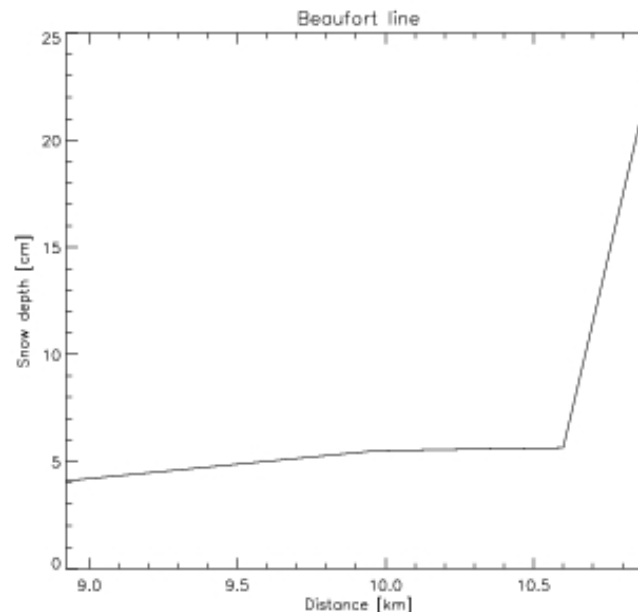
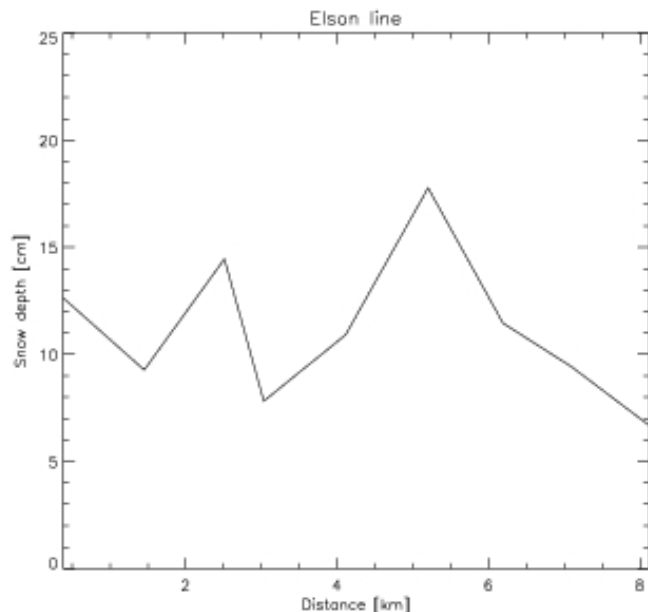
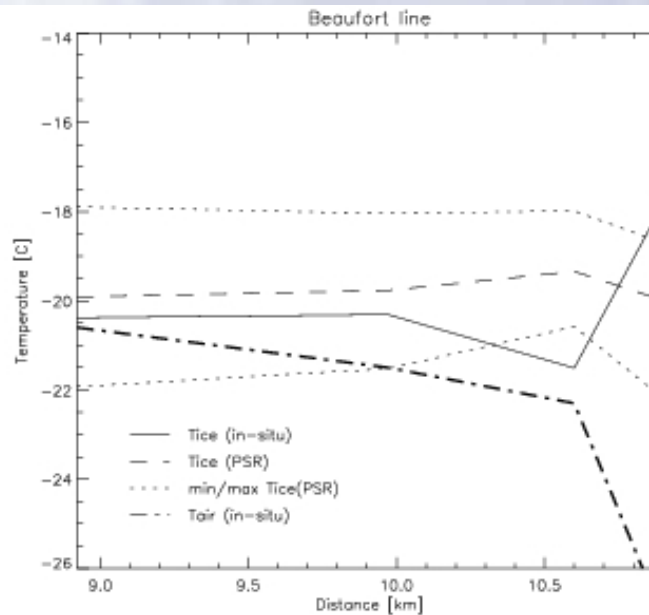
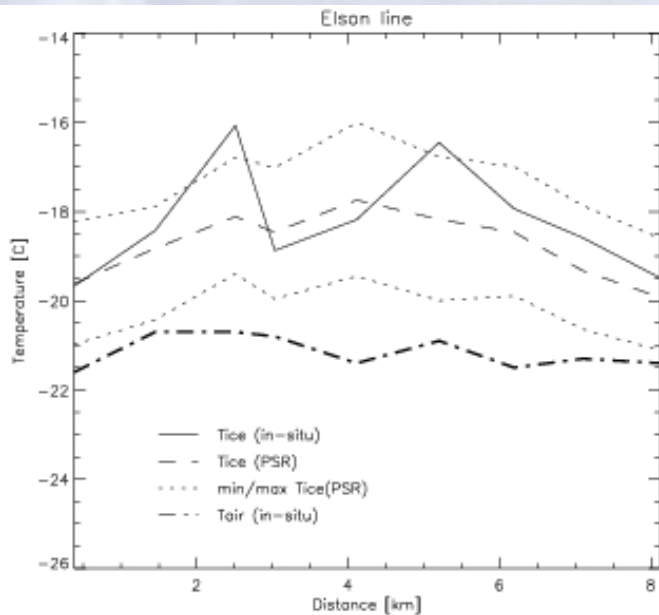
# AMSRice03 Ice temperature validation:

a) Validation

b) Influence of snow depth  
on temp. retrieval



# AMSRice03 Ice temperature validation:



-Results are very sensitive to choice in ice emissivity

- For PSR we needed to use an emissivity of  $>1$  to bring data into agreement

- Changes in ice temperature as caused by changes in snow depth are not as strongly reflected in the 6 GHz data; 6 GHz TB is weighted average over the snow layer.

## Upcoming:

### -Algorithm refinement:

- Adjustment of NT2 tiepoints to account for validation findings
- Generation of NT2 uncertainty maps
- Modification of snow algorithm to better account for variations in ice characteristics

- A special section for IEEE Trans. Geoscience Rem. Sens. to cover the research results from the 2003 AMSR-E Arctic validation campaign has been submitted and been approved. Submission deadline for manuscripts is Nov. 15, 2005.

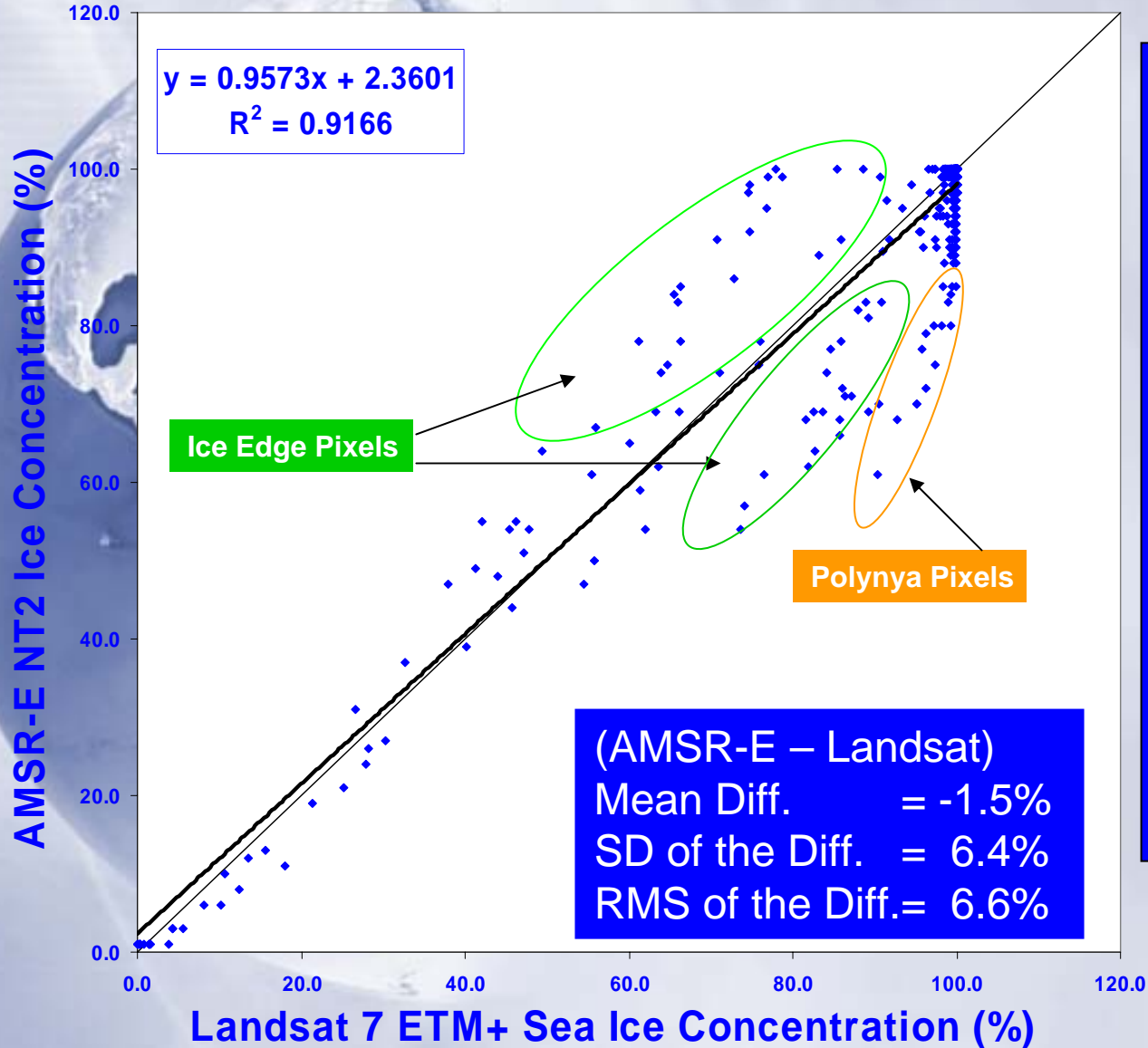
- Plans for Arctic snow on sea ice campaign in 2006 are making progress

- Results from the snow radar are very promising
- Still no certainty about the aircraft; options:
  - a) One aircraft (NASA P-3) w/ PSR and snow radar
  - b) Two aircrafts: NRL P-3 w/ radiometer, Twin Otter (or such) w/ snow radar
- Time frame still March 2006

# AMSRIce03 Ice concentration validation:

## Bering Sea Ice Concentration Comparison

### March 13, 2003



- March 13, 15, and 20 provided good temporal coincidence (~35 min) yielding 1,239 AMSR-E/Landsat 7 12.5 km grid cell comparisons.

- Overall, there is good agreement between AMSR-E and Landsat ice concentrations with little bias (~1%) for areas of first-year and young sea ice.

- Areas of new ice resulted in a negative bias of about 5% relative to Landsat with an RMS difference of 8%.

- For all ice types combined, the bias ranged from 0% to 3% and the RMS errors ranged from 1% to 5% depending on region.